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PATENT COOPERATION TREATY

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INTERNATIONAL SEARCH REPORT

(PCT Article 18 and Rules 43 and 44)

Applicant's or agent's file reference VM7031426003	FOR FURTHER ACTION <small>see Form PCT/ISA/220 as well as, where applicable, item 5 below.</small>	
International application No. PCT/US04/29277	International filing date (<i>day/month/year</i>) 03 September 2004 (03.09.2004)	(Earliest) Priority Date (<i>day/month/year</i>) 05 September 2003 (05.09.2003)

Applicant
VARIAN MEDICAL SYSTEMS TECHNOLOGIES, INC.

This international search report has been prepared by this International Searching Authority and is transmitted to the applicant according to Article 18. A copy is being transmitted to the International Bureau.

This international search report consists of a total of 2 sheets.

☒ It is also accompanied by a copy of each prior art document cited in this report.

1. Basis of the Report

- a. With regard to the language, the international search was carried out on the basis of the international application in the language in which it was filed, unless otherwise indicated under this item.

☐ The international search was carried out on the basis of a translation of the international application furnished to this Authority (Rule 23.1(b)).

- b. ☐ With regard to any nucleotide and/or amino acid sequence disclosed in the international application, see Box No. I.

2. ☐ Certain claims were found unsearchable (See Box No. II)

3. ☐ Unity of invention is lacking (See Box No. III)

4. With regard to the title,

☒ the text is approved as submitted by the applicant.

☐ the text has been established by this Authority to read as follows:

5. With regard to the abstract,

☒ the text is approved as submitted by the applicant.

☐ the text has been established, according to Rule 38.2(b), by this Authority as it appears in Box No. IV. The applicant may, within one month from the date of mailing of this international search report, submit comments to this Authority.

6. With regard to the drawings,

- a. the figure of the drawings to be published with the abstract is Figure No. 1

☒ as suggested by the applicant.

☐ as selected by this Authority, because the applicant failed to suggest a figure.

☐ as selected by this Authority, because this figure better characterizes the invention.

- b. ☐ none of the figures is to be published with the abstract.

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A. CLASSIFICATION OF SUBJECT MATTER

IPC(7) : H05G 1/64

US CL : 378/98.12

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

U.S. : 378/98.12, 98.11, 62; 382/130, 264

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched
NONE

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)
EAST

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	US 2003/0099388 A1 (DOI et al) 29 May 2003 (29.05.2003), Figure 5(b).	1-4, 6-14, 16-21, 23-31, 33, 34
Y		
X	US 6,125,166 A (TAKEO) 26 September 2000 (26.09.2000), Figure 1; column 19, line 14.	5, 15, 22, 32 35-47
Y,P	US 6,766,064 B1 (LANGAN et al) 20 July 2004 (20.07.2004), column 4, line 36.	5, 15, 22, 32
A	US 6,370,417 B1 (HORBASCHEK et al) 09 April 2002 (09.04.2002), see entire document.	1-47

☐ Further documents are listed in the continuation of Box C.

☐ See patent family annex.

* Special categories of cited documents:

- *A* document defining the general state of the art which is not considered to be of particular relevance
- *E* earlier application or patent published on or after the international filing date
- *L* document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)
- *O* document referring to an oral disclosure, use, exhibition or other means
- *P* documents published prior to the international filing date but later than the priority date claimed

- *T* later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention
- *X* document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone
- *Y* document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art
- *Z* document member of the same patent family

Date of the actual completion of the international search

04 February 2005 (04.02.2005)

Date of mailing of the international search report

15 FEB 2005

Name and mailing address of the ISA/US

Mail Stop PCT, Attn: ISA/US
Commissioner for Patents
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PATENT COOPERATION TREATY

From the
INTERNATIONAL SEARCHING AUTHORITY

To:
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PCT

WRITTEN OPINION OF THE
INTERNATIONAL SEARCHING AUTHORITY

(PCT Rule 43bis.1)

Applicant's or agent's file reference VM7031426003		Date of mailing (day/month/year) 15 FEB 2005
International application No. PCT/US04/29277		FOR FURTHER ACTION See paragraph 2 below
International filing date (day/month/year) 03 September 2004 (03.09.2004)	Priority date (day/month/year) 05 September 2003 (05.09.2003)	
International Patent Classification (IPC) or both national classification and IPC IPC(7): H05G 1/64 and US Cl.: 378/98.12, 98.11, 62; 382/130, 264		
Applicant VARIAN MEDICAL SYSTEMS TECHNOLOGIES, INC.		

1. This opinion contains indications relating to the following items:

- ☒ Box No. I Basis of the opinion
- ☐ Box No. II Priority
- ☐ Box No. III Non-establishment of opinion with regard to novelty, inventive step and industrial applicability
- ☐ Box No. IV Lack of unity of invention
- ☒ Box No. V Reasoned statement under Rule 43bis.1(a)(i) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement
- ☐ Box No. VI Certain documents cited
- ☐ Box No. VII Certain defects in the international application
- ☐ Box No. VIII Certain observations on the international application

2. FURTHER ACTION

If a demand for international preliminary examination is made, this opinion will be considered to be a written opinion of the International Preliminary Examining Authority ("IPEA") except that this does not apply where the applicant chooses an Authority other than this one to be the IPEA and the chosen IPEA has notified the International Bureau under Rule 66.1bis(b) that written opinions of this International Searching Authority will not be so considered.

If this opinion is, as provided above, considered to be a written opinion of the IPEA, the applicant is invited to submit to the IPEA a written reply together, where appropriate, with amendments, before the expiration of 3 months from the date of mailing of Form PCT/ISA/220 or before the expiration of 22 months from the priority date, whichever expires later.

For further options, see Form PCT/ISA/220.

3. For further details, see notes to Form PCT/ISA/220.

Name and mailing address of the ISA/US Mail Stop PCT, Attn: ISA/US Commissioner for Patents P.O. Box 1450 Alexandria, Virginia 22313-1450 Facsimile No. (703) 305-3230	Authorized officer JOSE G. DEES Telephone No. (571) 272-1607
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Box No. I Basis of this opinion

1. With regard to the language, this opinion has been established on the basis of the international application in the language in which it was filed, unless otherwise indicated under this item.

☐ This opinion has been established on the basis of a translation from the original language into the following language _____, which is the language of a translation furnished for the purposes of international search (under Rules 12.3 and 23.1(b)).

2. With regard to any nucleotide and/or amino acid sequence disclosed in the international application and necessary to the claimed invention, this opinion has been established on the basis of:

a. type of material

- ☐ a sequence listing
☐ table(s) related to the sequence listing

b. format of material

- ☐ in written format
☐ in computer readable form

c. time of filing/furnishing

- ☐ contained in international application as filed.
☐ filed together with the international application in computer readable form.
☐ furnished subsequently to this Authority for the purposes of search.

3. ☐ In addition, in the case that more than one version or copy of a sequence listing and/or table relating thereto has been filed or furnished, the required statements that the information in the subsequent or additional copies is identical to that in the application as filed or does not go beyond the application as filed, as appropriate, were furnished.

4. Additional comments:

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Box No. V Reasoned statement under Rule 43 bis.1(a)(i) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

1. Statement

Novelty (N)

Claims 5, 15, 22, 32 YES

Claims 1-4, 6-14, 16-21, 23-31, 33-47 NO

Inventive step (IS)

Claims 5, 15, 22, 32 YES

Claims 1-4, 6-14, 16-21, 23-31, 33-47 NO

Industrial applicability (IA)

Claims 1-47 YES

Claims NONE NO

2. Citations and explanations:

Please See Continuation Sheet

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Supplemental Box

In case the space in any of the preceding boxes is not sufficient.

V. 2. Citations and Explanations:

Claims 1-4, 6-14, 16-21, 23-31, and 33-34 lack novelty under PCT Article 33(2) as being anticipated by Doi et al. (US 2003/0099388).

Regarding claims 1, 11, 18, and 28: Doi teaches a method or a computer readable medium having a set of stored instruction of processing a x-ray image, comprising: collecting a first x-ray image (upper section image) and a second x-ray image (lower section image); determining a composite image (mask image) based on the first (upper section image) and second x-ray images (lower section image); collecting a third x-ray image (target section image); and adjusting (subtraction) the third x-ray image (target section image) based on the composite image (mask image) (Figure 5(b)).

Regarding claims 2, 12, 19, and 29: Doi teaches the first, second, and third x-ray images are generated in a sequence (upper, target, lower images).

Regarding claims 3, 13, 20, and 30: Doi teaches the first, second, and third x-ray images are each contains an image of at least a portion of an animal body (22).

Regarding claims 4, 14, 21, and 31: Doi teaches the determining a composite image comprises performing a image averaging on the first and second x-ray images (linear interpolation).

Regarding claims 6, 16, 23, and 33: Doi teaches the image averaging is performed based on a weighted average (linear, equal weighted, interpolation).

Regarding claims 7, 17, 24, and 34: Doi teaches the adjusting comprises subtracting the composite image from the third x-ray image (118).

Regarding claims 8 and 25: Doi teaches a system for processing a x-ray image, comprising: means (32) for collecting a first x-ray image (upper section image) and a second x-ray image (lower section image); means (36) for determining a composite image (mask image) based on the first (upper section image) and second x-ray images (lower section image); means (32) for collecting a third x-ray image (target image); and means (36) for adjusting the third x-ray image (target image) based on the composite image (mask image).

Regarding claims 9 and 26: Doi teaches the means for determining a composite image comprises means (36) for performing an image averaging (linear interpolation) on the first and second x-ray images.

Regarding claims 10 and 27: Doi teaches the means for adjusting comprises means for subtracting (118, column 6, line 62) the composite image from the third x-ray image.

Claims 35-47 lack novelty under PCT Article 33(2) as being anticipated by Takeo (US 6,125,166).

Regarding claims 35 and 43: Takeo teaches a method or a computer readable medium having a set of stored instruction of processing a x-ray image, comprising: obtaining a first x-ray image (41); obtaining a second x-ray image (42); and determining a composite image (43) based on at least a portion of the first (41) and second (42) x-ray images.

Regarding claims 36 and 44: Takeo teaches the first (41) and second (42) x-ray images are generated in a sequence (by scanning phosphor screen 5 and 7).

Regarding claims 37 and 45: Takeo teaches the first and second x-ray images each contains an image of at least a portion of an animal body (Figure 1).

Regarding claims 38 and 46: Takeo teaches the determining a composite image comprises subtracting at least a portion of the first

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Supplemental Box

In case the space in any of the preceding boxes is not sufficient.

x-ray image from at least a portion of the second x-ray image (Figure 1).

Regarding claims 39 and 47: Takeo teaches determining a value associated with a contrast of the composite image (column 19, line 14).

Regarding claim 40: Takeo teaches a system for processing a x-ray image, comprising: means (5) for obtaining a first x-ray image (41); means (7) for obtaining a second x-ray image (42); and means (30) for determining a composite image (43) based on at least a portion of the first x-ray image (41) and at least a portion of the second x-ray image (42).

Regarding claim 41: Takeo teaches the means for determining a composite image comprises means for subtracting at least a portion of the first x-ray image from at least a portion of the second x-ray image (Figure 1).

Regarding claim 42: Takeo teaches means for determining a value associated with a contrast of the composite image (column 19, line 14).

Claims 5, 15, 22, and 32 meet the criteria set out in PCT Article 33(2)-(3), because the prior art does not teach or fairly suggest the systems and methods for processing x-ray images as claimed.

Claims 1-47 meet the criteria set out in PCT Article 33(4), and thus have industrial applicability because the subject matter claimed can be made or used in industry.